Original Article

REDUCING POST OPERATIVE BLEEDING AFTER TONSILLECTOMIES IN CHILDREN BY MODIFYING THE MONOPOLAR DIATHERMY TECHNIQUE: A STUDY OF 1500 PATIENTS

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ABSTRACT

Objective: To evaluate the effects of modifications of the present technique of monopolar diathermy tonsillectomy on the incidence of post operative bleeding and compare them with international data for tonsillectomies done without modifications.

Methodology: This is a prospective, longitudinal experimental study. Fifteen hundred patients were studied from January 2000 to January 2008. Patient's age ranged from five to fifteen years. All patients underwent tonsillectomies by modified monopolar diathermy method. The incidence of postoperative bleeding was assessed.

Results: Two patients developed significant secondary haemorrhage, which is defined as requiring a return to the operating theater for the control of bleeding. One patient with secondary bleed required blood transfusion in addition to a return to the operating theater. Five patients developed minor secondary bleed that was controlled by conservative means. Two patients developed reactionary bleeding that was controlled in the operating room before return of the patient to the bed.

Conclusion: Modifications in the existing technique produces a significantly lower incidence of post operative bleeding from the tonsillar fossae and compares well than those reported in the international literature.

KEY WORDS: Tonsillectomy, Modified diathermy technique, Bleeding.

Pak J Med Sci April - June 2010 Vol. 26 No. 2 434-437

How to cite this article:

Gooda MR, Sheikh I, Suleri A. Reducing Post Operative bleeding after tonsillectomies in children by modifying the Monopolar Diathermy technique: A study of 1500 patients. Pak J Med Sci 2010;26(2):434-437.

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* Received for Publication: August 10, 2009
* Revision Received: March 13, 2010
* Revision Accepted: March 15, 2010

INTRODUCTION

Tonsillectomy is the most widely performed surgery by ENT surgeons anywhere in the world. There are two major indications of tonsillectomy, sleep apnea syndrome and chronic tonsillitis. In younger children the former is the most common indication and tonsillectomy is the most common therapy.[1-3] The dissection and the diathermy methods are most cost effective.

The diathermy methods requires less operative time, produces a bloodless operative field and ensures complete removal of the tonsil. Studies, however, support increased chances of

postoperative bleeding, pain and slough formation in the tonsillar fossae in diathermy than in cold tonsillectomies.[4] The cause of this is believed to be the changes in the tissues from the heat of the arc which flows from the tip of the diathermy needle.

If the thermal effects of diathermy in producing increased post operative pain and bleeding are so significant, then, could modifications, made to minimize these thermal effects on the Peritonsillar tissues, produce an exact opposite effect? The purpose of this study was to find out an answer to this question.

METHODOLOGY

In our series 1500 patients underwent tonsillectomies for chronic tonsillitis. Twelve hundred patients were in the 5-8 years age group, 193 were in the 9-12 years age group and 107 were in the 13-15 years age group.

The procedure was carried out using monopolar diathermy on both sides. All patients underwent a preoperative complete blood count, Prothombin time & activated partial thromboplastin time. All patients had been free of infection/inflammation prior to surgery and had received a course of antibiotics two weeks before surgery. The patient/parents were unaware of the methodology adopted during tonsillectomies. The surgeries were performed by the well experienced surgical team members who were well conversant with the modifications. All patients come to the OR with a freshly brushed mouth. Menstruating females were operated in mid-cycle. Valley Lab diathermy machine was used for dissection & coagulation.

What modifications were used?

The mucosa along the pillars was cut with scissors instead of diathermy and Injection Pyrolate was used 30 minutes before induction of anesthesia to reduce oral secretions. A pointed diathermy needle (Colorado needle) was used for dissection, minimum current setting of 8 Watts was used for dissection, long acting local anesthetic, Abbocaine, was used on both sides for equal time. The tonsil was pulled medially and diathermy was used on the stretched connective tissue attached to the tonsil rather than on the tonsillar bed.

Exclusion Criteria: Patients undergoing simultaneous adenoidectomies, those who demonstrated preoperative coagulation disorders on blood test and those who required ligation of bleeders in the tonsillar bed were excluded from the study.

Post Operative Treatment: All patients were discharged after 24 hours with standard treatment protocol consisting of: Amoxicillin + Clauvulnic Acid in appropriate doses for one week, Ibuprofen in age adjusted doses. Advice was given to take bland diet for a week, ensure good brushing of teeth after every meal and using chewing gum to ensure dynamic pharyngeal muscular exercise Follow-up examination was done every two days for a total of five visits. History was taken for blood tinged saliva and the fossae were observed for evidence of blood clot. The time taken for reduction of slough size by 50%, and complete epithelialisation the tonsillar fossae was noted. This is directly commensurate with degree of healing of the tonsillar fossae.

Table-I: Incidence of bleeding in this study

	Diathermy Tonsillectomy	
	Present Study	*International Data*
Secondary Bleeding after tonsillectomy	9/1500 or 0.6 %	18/1133 or 1.6 % (22) 37/1557 or 2.38% (23) 1840/40,000 or 4.6% (25)

RESULTS

In this study there were six incidence of secondary bleeding (0.6%). This is contrary to the international data which showed results varying from 1.6% to 4.6%.

DISCUSSION

The indications of tonsillectomy are straightforward but the methods of removing the tonsils differ. The primary goal of any surgical technique is to completely remove the tonsil,

Table-II: Size of the Slough

Slough reduced by 50%	5 Days
Appearance of complete mucosal cover	10 days

maintaining patient's safety and reduce post-operative morbidity. The later consideration has been the focus of recent technologic innovations in tonsillectomy technique.[5] There are many factors which have been reported to affect the incidence of post operative pain and bleeding in patients undergoing tonsillectomies.

Use of non steroidal anti inflammatory agents and the use of intra operative steroids reduce postoperative morbidity in the first 48 hours, especially the morbidity associated with vomiting.[6-8] Use of antibiotics reduces halitosis, pain and poor oral intake.[9] The use of steroids and antibiotics has become common place in pediatric tonsillectomies. However their efficacy is debated in some patient groups.[10]

Most tonsils are removed by blunt dissection and securing hemostasis by using monopolar and bipolar diathermy or catching a bleeder and tying it with silk sutures. This technique has been described as "cold tonsillectomy". With the advent of electrocautery, tonsillectomy has been performed with electrocautery alone. This is commonly called "hot tonsillectomy".[11, 12]

Microdebrider has been used in small children with obstructive sleep disturbances and involves leaving a small amount of tonsillar tissue adjacent to the tonsillar capsule. In this manner post operative pain is reduced.[13] Ultrasonic and plasma mediated tissue Coblation techniques have not demonstrated significant changes in postoperative morbidity as compared to other techniques, despite less tissue injury.[14-16]

Micro dissection needle for diathermy tonsillectomy results in decreased postoperative pain when compared to use of a standard diathermy tip because in the former a small arc flowed from the tip to the tissues.[17] This probably is because of less heat related damage to the tonsillar fosse. Bipolar cautery causes the flow of current between two prongs of the forceps whereas monopolar cautery results in a larger area of necrosis and increased chances of secondary hemorrhage.[18]

Diathermy results in a neat removal of the tonsil off its bed but the incidence of hemorrhage after tonsillectomy depends upon the exposure of the blood vessels in the bed. Use of monopolar diathermy results in larger area of necrosis and increased chances of secondary hemorrhage.[19] Using a bipolar diathermy to hold the bleeder rather the muscle of the bed also results in less muscular injury on the tonsillar bed. The efficiency with which "Hot Tonsillectomy" can be performed as compared to "Cold Tonsillectomy" is debated in many studies.[20]

It is said that there is a local rise of temperature to about 100 degrees centigrade.[21] We believe that oral secretions cause a dispersion of the heat from diathermy and causes secondary damage to the surrounding tissues. Hence, we advocate the use of Inj. Pyrolate to reduce oral secretions. We believe that using a scissor to cut the mucosa of the anterior and posterior pillars instead of using diathermy prevents thermal damage to the palatoglossus and palatopharyngeus muscles and using the small cutting arc of the pointed diathermy tip on the tonsil, rather on the tonsillar bed, cause less harm to the mucosa and the muscles on the tonsillar bed. In our study the use of minimum current, avoiding use of the current on the pillars and using the current on the tonsillar tissue instead of the bed, spared the bed from its effects.

In our study the incidence of bleeding was 0.6% (9/1500) patients. The modifications produced better results in the incidence of postoperative bleeding than conventional monopolar diathermy method without these modifications. In a study of 1133 consecutive cases in 2007, the incidence of secondary post operative hemorrhage , requiring readmission and a return to surgery, was 1.6% compared with 1.04 % for blunt dissection and a higher rate of blood transfusion (0.49% compared with 0.2%).[22]

In a prospective, nonrandomized cohort study of postoperative hemorrhage done to analyze the incidence of bleeding after 1557 diathermy tonsillectomies there were 37 (2.38%) bleeds. If cold dissection is taken as the "control" and diathermy tonsillectomy as the "treatment" group, the relative risk of bleeding after diathermy tonsillectomy is 1.30 (95% confidence interval 0.88-1.93).[23]

In a paper titled "A 10 year review of tonsillectomy in a tertiary center" Wong reported an incidence of 2.4% secondary hemorrhage.[24] A national tonsillectomy audit published by the Royal College of Surgeons of England in 2005, included data on more than 40,000 patients who underwent a tonsillectomy. About 3.5% of the patients had a postoperative hemorrhage in the first 28 days after the surgery. Patients who had their tonsils removed with cold steel and the bleeding stopped with ties and packs had a tonsillar hemorrhage rate of 1.7%. Patients in whom a hot technique was used only to stop the bleeding had a hemorrhage rate of 2.7%, whereas patients in whom hot techniques were used to remove the tonsils as well as to stop the bleeding had a hemorrhage rate of 4.6%.[25] In view of all this, the results of this study are encouraging. It is recommended that these modifications be incorporated in the existing techniques of monopolar diathermy.

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